**Devise a detailed method, including how you would control and monitor important variables (8 marks)**

State the independent and dependent variable
Method to measure dependent variable using measurement and calculations
Mention any relevant formulas for measurements
State the range of the  independent variable (5 different ones)
State at least 2 control variables and how it is controlled (e.g thermostatic controlled water bath for temperature)
Repeat the procedure to get the mean result for reliability

**State a suitable null hypothesis for this investigation MS examples (1 mark)**

There is no (significant) correlation between the (mean) percentage of germination (after 4 days) and the concentration of arsenic ion

There is no (significant) difference between the diameter of control stems and experimental stems

**Describe preliminary practical work that you might undertake to find a suitable method for observing these grasshoppers to provide quantitative results. (3 marks)**

- Practice the proposed method to see if it will work or not
- Find a suitable time of day/month…
- Find a suitable method…
- Find a suitable sampling method
- Find suitable weather conditions

Find a suitable

- method to measure dependent variable
- variations/conc of independent
- method to control and identify controls etc

**Suggest two/three limitations of your proposed method (3 marks)**

Difficult to control all the variable that can affect the dependent variable

Example of two variables that's difficult to control
Use the phrase "Difficult to control/standardise/prevent/to measure/to decide…etc"

**Abiotic and Biotic factor and how they are controlled (Common MS examples to learn)**

Abiotic - Temperature, pH, Light intensity, Wavelength of light, Oxygen concentration, Humidity

Biotic - Age, Sex, Disease, Species, Mass of specie

Temperature - Thermostatically controlled water bath/room
pH - Buffer
Light intensity - Bulb of known voltage at known distance
Humidity - Dehumidifier/Humidifier

**Describe how your results should be recorded, presented and analysed in order to draw conclusions from your investigation (3 marks)**

Table to record data with headings. Appropriate units and means calculated from repeats
Line/scatter graph format with labeled axes
Use of an appropriate (named) statistical test - T-test if only two variables otherwise a correlation test

Table for raw data with headings and units, and means calculated from repeats (1)
Line graph format with labelled axes (1)
Use of an appropriate correlation statistical test (1)

**Explain why it may not be reasonable to draw valid conclusions from the results of this investigation (2 marks)**

Range bars overlap
Other variable is not monitored/measured

**Suggest two improvements that could be made to this investigation (2 marks)**

More samples
Compare with other samples not using..
Control and measure biotic factors, environment
Different concentrations